PHOTOVOLTAIC MODULES SERIES EL 60 AND EL 72

Manual for the Safety, Installation, Use, Maintenance, Warranty and Disposal

ELECTRIC EQUIPMENT – CONSULT A PROFESSIONAL PHOTOVOLTAIC SYSTEM INSTALLER

ELIFRANCE. EL series photovoltaic modules have been designed to generate electricity in DC from solar energy

This manual contains important information for the safety, installation, use, maintenance, warranty and disposal of the modules

It is strictly recommended to keep and read it carefully before the installation, use and all other activities

The installer and the user of the modules are the only responsible for the respect of all local authorizations and legal regulations connected with the installation of the modules. No responsibility can be attributed to the module manufacturer for the non-observance of the applicable regulations and the instructions contained in this manual

GENERAL INFORMATION

- ☐ Before performing any module installation, wiring, operation and maintenance, it is necessary to acquire all the instructions required for the installation and safety of the whole photovoltaic (PV) system.
- ☐ During the installation, it is compulsory to adhere to all regulatory requirements established by local, regional and national directives, laws and instructions.
- ☐ Installation and maintenance must be performed only by authorized company.
- ☐ Broken or damaged modules must be carefully handled and disposed in accordance with current regulations. Broken glass can be sharp- edged and cause wounds if not handled with appropriate protective equipment.
- ☐ Photovoltaic modules produce voltage even when not connected to an electrical circuit or load.
- ☐ Photovoltaic modules generate a voltage value close to the open circuit even when they are exposed to solar radiation and even for just 5% of their surface; furthermore, both electrical current and power increase with the intensity of the incident light.
- ☐ Standard rated specifications of the sector are established in conditions of irradiation of 1000W/m2 and 25 °C (A.M. 1,5) temperature. Lower temperatures can greatly increase both voltage and power.
- ☐ Make sure that the modules are subject to ambient temperature between- 40°C and + 80°C. Thermal excursions larger than these specified may severely degrade the efficiency and compromise module useful life.
- ☐ Snow, water or other surfaces reflection can intensify solar light thus increasing both the current and the power generated by the module. It is strictly important to consider this when sizing the system.
- ☐ NEVER convey artificially sunlight on the module with mirrors, lenses, screens or other means.
- ☐ The EL series modules are designed and manufactured exclusively for outdoor use in a system designed, assembled and installed by professional installers, qualified in accordance with law, for permanent use at a predefined location and for the production of energy from solar light for public, commercial, industrial and residential applications.
- ☐ Photovoltaic modules are not designed for indoor use or application on moving vehicles of any kind. Among the excluded applications, without limitation, there are installations where modules come into contact with salty water or where they can be swamped in whole or in part by salty or fresh water, such as on boats, jetty and buoys.
- ☐ Use only equipments, connectors, wiring and support frames specifically designed for photovoltaic system.
- ☐ In normal conditions, photovoltaic module may produce more current and / or voltage as indicated in standard conditions. Therefore the ISC and VOC values shown on module label should be multiplied by a factor of 1.25 to determine the maximum tolerable value of the components of the installation, related to voltage, current, conductor section, fuses, and size of controls connected to the output of the photovoltaic generator.

MODULES HANDLING SAFETY REGULATIONS

- ☐ Do not use junction box and cables to grab or transport the module.
- ☐ Do not step on the module, do not drop the module and not to drop objects on the module.
- ☐ Do not damage or scratch the rear surface of the module.
- ☐ Always put down carefully the module on any surface, particularly when placing it in a corner.
- ☐ Do not disassemble, modify or adapt the module and do not remove any part or labeling installed by the manufacturer. This will void the warranty.
- ☐ Do not punch hole in the frame, in the glass surfaces or in the front or rear surfaces.
- ☐ Do not apply paint or adhesive on the surface of the module as well as on the back surface, this will void the warranty.
- ☐ Never leave module without any support or unsecured.
- ☐ A module with broken glass or with damaged back surface can neither be repaired nor used. Contact with any part of the inner parts of the module or the frame can produce electrical shock.
- ☐ Work only under dry conditions using only dry tools. Never handle modules when are wet.

INSTALLATION SAFETY REGULATIONS

- ☐ Do not perform modules installation in presence of strong wind.
- ☐ It is necessary the use of appropriate safety procedures and protective equipment provided by the system designer to avoid falling or other safety hazards when installation is performed at high points.
- ☐ Photovoltaic modules do not have the on / off switch. To disable the modules it is necessary to move them away from light or completely cover the front surface with an opaque material, or by working with modules face down on a smooth, flat surface.
- ☐ When working on the modules exposed to sunlight, it is necessary to comply with the current regulations regarding the handling of electrical equipment.
- ☐ Do not touch the electrical terminals or cable ends during the installation or when module is exposed to sunlight.
- ☐ Never open electrical connections (junction box) or unplug connectors while the circuit is live or the modules are under sunlight.
- ☐ Do not insert anything in the current conductor connectors
- ☐ Contact with module electrically active parts such as terminals can result in burns, sparks and lethal shock whether the module is connected or disconnected.
- ☐ Always use insulated tools and rubber gloves approved for working on electrical installations.

FIRE PREVENTION SAFETY REGULATIONS

- ☐ Check with local authorities for guidelines and requirements for fire safety of buildings or structures.
- ☐ The installation of the modules on a roof, could affect the conditions of fire safety or structural stability. Before the installation it is important to verify with the local Fire Authority the necessity to prepare a covering of the roof, certified and resistant to fire according with the local regulations.
- ☐ Do not use modules close to equipment or locations where can be generated or collected flammable or explosive atmospheres.

ELECTRICAL INSTALLATION GUIDE

- ☐ The maximum open circuit voltage must not exceed the maximum system voltage specified for the module.
- ☐ All modules are equipped with fast connectors and cables installed by the manufacturer. The modules are designed to be easily connected in series.
- ☐ Only use cable type, section and connections approved for photovoltaic use and sized for the maximum short-circuit current of the module when the system has to be connected. It should be used at least cables with 4 mm^2 copper wire, insulated for a minimum of 90°C and sunlight resistance with insulation designated as PV Wire.
- ☐ When making connections, match the polarities of cables and terminals, otherwise irreparable damage to the module can occurred
- ☐ Module is equipped with bypass diodes installed by the manufacturer and set inside the junction box. The junction box is not designed or certified to ensure accessibility or maintenance on site and can under no circumstances be opened. Opening the junction box may void the warranty.
- ☐ Inverters not equipped with transformer do not arrange galvanic separation between AC-DC side; it is suggested to keep in mind this for grounding in order to be compliant with the IEC standards

- Warning:

The connection of the modules with reverse polarity to a source of high-power current, like a battery, will destroy the bypass diodes and makes module unusable. Bypass diodes cannot be replaced by the user.

PHOTOVOLTAIC MODULES SERIES EL 60 AND EL 72

Manual for the Safety, Installation, Use, Maintenance, Warranty and Disposal

GROUNDING SYSTEM GUIDE

(Valid for connection to the power supply in the EU countries)

- Photovoltaic modules are electrical products "Class 2" (Double Insulation)
- Although photovoltaic modules do not require a frame grounding system, the local or national regulations of the place of installation may require this device for electrical protection purposes, for example caused, but not necessarily, by lightning. For this reason the module is designed for grounding through small metal screws (not supplied) to be coupled into a hole in the mounting frame.
- The suitability and efficiency of the grounding system must be first verified by the installer before the connection of the modules. Direct grounding system means the direct connection between ground and the metal parts of the module (mounting frame) without the use of a resistor.
- Follow the specific directions regarding the direct grounding pole DC provided by the supplier of the inverter used. These indications depend on the brand and the specific type of inverter to be used in the plant.
- The grounding system must be able to carry at least 125% of the short-circuit current of the group (Isc).
- The protection class 2 is granted on the condition that all components and seat used for grounding are provided with certification of Class 2.
- According to the international standard IEC 60364, section 712.312.2, active wiring grounding on the DC side of a group is granted on the condition that electrical isolation between the AC and the DC side of the inverter are founded. The inverters equipped with transformer have galvanic isolation between the AC and DC sides thus making the performance of these devices in groups with photovoltaic electrical grounding system compatible with the IEC standards.

Limit of connecting the modules in series

Must be connected in series only identical PV modules that is to say modules of same type and same power class. When connected in series, be careful not to exceed the maximum allowable voltage of the system. It is compulsory to pay attention to the temperature dependence of the voltage of the module, especially because the module voltage increases in case of lower temperatures. Consequently, modules may be connected in series up to the achievement of this voltage.

The connecting cables must be appropriately sized for the voltage values achieved.

The maximum voltage of the system allowed by the inverter must not be exceeded for any reason. Therefore, due to the negative temperature coefficient of the PV modules, it must be calculated the open circuit voltage of the entire system at the lowest possible temperature (see data sheet and plate of the module)

Limit of connecting the modules in parallel

It can be connected in parallel all the modules compatible with the inverter, or with the equipment on which they should be interlinked.

It will be necessary to use cables having a suitable cross section for the driving of the sum of the currents generated by the single module.

The conductor to be used shall not, however, have a lower section than 8 mm^2.

MECHANICAL INSTALLATION GUIDE

- The installation of photovoltaic modules must maximize the direct exposure to sunlight and eliminate or minimize the presence of shadows.
- Even the presence of some areas of shade on the surface of the module can greatly reduce the production of energy both for the module and the system.
- Modules must be securely fastened using support frames or specific kits of supports for photovoltaic applications.
- The mounting method does not block the module drainage holes.
- The module frame must be connected without wringing the substructure profiles (support profiles) in conformity with the appropriate fixing holes on the long side. In general, the fixing on the short side of the frame is not allowed.
- The modules can be installed at any angle with an orientation from portrait to landscape.
- The accumulation of dirt on the surface of the module can cause shadow on photovoltaic cells and cut the electrical efficiency.
- For over the roof installation, it is important to provide an adequate ventilation of the bottom of the modules in order to cool temperature down (minimum space 100 mm).
- It is necessary to leave a space of at least 10 mm between adjacent modules to allow the thermal expansion of the frames.
- Modules must not be covered by water. Should be avoided the accumulation of rainwater and thaw.
- Keep the back surface of the module free from any foreign objects or structural elements which could come into contact with the module, in particular when it is under mechanical load
- Walking on the modules can cause irreparable damage. Such damage is not covered by the warranty upon the product and performance.
- It is necessary to make sure that modules are not subjected to wind or snow loads exceeding the maximum permitted loads and are not subjected to excessive forces due to thermal expansion of the support frame.
- It must be avoided any exposure to water and / or flooding of the back surface of the module.
- The frame of the module has eight 9x14mm mounting holes to secure the modules to the supporting structure. To reach the nominal mechanical resistance, use, for the fixing, at least the four mounting holes farther from the short sides of the frame. Secure the module in each fixing location with an M8 mm bolt, flat washer, spring washer and nut. Then tighten to a torque of 16 Nm. It is strongly recommended the use of corrosion proof fittings (stainless steel).
- In case of use of clamps to fix the module on the supporting structure, it is recommended to comply with the instruction provided by the supplier of the fixing system in addition to the instructions present in this manual.

USE AND MAINTENANCE

- It is not required routine maintenance. However, it is advisable to carry out periodic inspections to verify possible damages to glass, back-sheet, frame, junction box and external electrical connections.
- Verify the absence of electrical connections lack or corrosion.
- The photovoltaic modules grant efficient performances even in the absence of washes; however, the presence of dirt on the front glass can significantly cut the production of energy.
- EL photovoltaic modules series use front glass equipped with a resistant, durable and anti-reflection surface designed to improve electrical performance.
- It is possible to wash or rinse with water the coated front glass to remove dust, dirt or other deposits. Do not, under any circumstances, use chemicals or harsh or abrasive cleaners on the front glass. Do not use alkaline substances, including solutions containing ammonia and acids.
- During maintenance on the modules exposed to sunlight, it is necessary to comply with the current regulations and safety cares regarding the handling of live electrical equipment. Do not touch the electrical terminals or cable ends and never open electrical connections (junction box) or unplug connectors.
- Photovoltaic module do not have the on / off switch and generally it is connected in the plant with other modules. Before any maintenance operation on the module it is necessary to move them away from light or completely cover the front surfaces with an opaque material and check the absence of dangerous voltage.

LIABILITY

- Since the use of this manual and the conditions or methods of installation, use, maintenance and disposal of the modules are beyond the control exerted by ELIFRANCE, the company does not assume any liability and explicitly disclaim any responsibility for loss, damage, injury or expense arising out of or in connection with such installations, operation, use, maintenance and disposal of the module.
- All the information in this Manual are result of knowledge and experience acquired by ELIFRANCE and are reliable; such information, for example indicative product specifications and suggestions do not constitute warranty, expressed or implied. ELIFRANCE reserves the right to make changes to the product, specifications or this manual without any notice.

CERTIFICATIONS

The manufacturer assures that the manufacturing of the photovoltaic modules is done according to the following international:

- ISO 9001 Quality system management certification of the manufacturing site.
- ISO 14001 Environmental system management certification of the manufacturing site.
- OHSAS 18001: Health and Safety system management certification of the manufacturing site.
- Product certificate according to IEC 61215 edition 2 e IEC 61730-2 Class A
- Fire Reaction Classification: B-s2-d0 according to EN 13501-1 and "Classe 1" according to UNI 9177

PHOTOVOLTAIC MODULES SERIES EL 60 AND EL 72

Manual for the Safety, Installation, Use, Maintenance, Warranty and Disposal

WARRANTY

Elifrance EL photovoltaic modules series are covered by the following warranty clauses:

CLAUSE 1:
10 years warranty against manufacturing defects.
Elifrance grants that its photovoltaic modules, the MC connectors and cables assembled in the factory are free from defects in materials and manufacture under conditions of installation, use and applications for a nominal period of 10 YEARS from the date of sale (attested by the bill of sale). In case of modules dissimilarity observed within the aforementioned 10 years, ELIFRANCE at its own discretion, may take charge of repairing or replace the faulty products. The repairing or replacement shall constitute the only form of compensation provided by this clause and it cannot be extended beyond the aforementioned 10 years. Repairing or replacement will be due only to the final customer.
This clause does not constitute, in any way, a form of guarantee about the power supplied by the photovoltaic module.

CLAUSE 2a:
10 years warranty on power peak output.
If within a period of 10 years from the date of sale (attested by the bill of sale) a photovoltaic module should exhibit a power output lower than 90% of the minimum contractual output power (it refers to peak power at STC condition, cutted tolerance down), ELIFRANCE, at its own discretion, might proceed with an integration of photovoltaic modules or a replacement of faulty ones to the final consumer in order to recover the power lost.

CLAUSE 2b:
25 years warranty on power peak output.
If within a period of 25 years from the date of sale (attested by the bill of sale), a photovoltaic module should exhibit a power output lower than 80% of the minimum contractual output power (it refers to peak power at STC condition, cutted tolerance down), ELIFRANCE, at its own discretion, might proceed with an integration of photovoltaic modules or a replacement of faulty ones to the final consumer in order to recover the power lost.

The actions described in clauses 2a and 2b are the only form of compensation provided for the lost of peak power.

Peak Power at STC conditions
The peak power at STC conditions is the peak power expressed in Watts that the new photovoltaic module generates at its maximum electrical power point and it is stated on the label.
The test standard condition (STC) are:
a) Light spectrum AM 1.5
b) irradiance di 1000W/m² perpendicular
c) cell temperature 25°C
The measurements are made on the output connectors, in accordance to IEC 61215.

WARRANTY LIMITATIONS

1. All guarantee application instances must be submitted during the warranty coverage period.
2. Guarantee clauses 1 and 2 will not apply, and ELIFRANCE will not be liable for any obligation toward photovoltaic modules that have been subject to:
   - Improper, incorrect, negligent use or accident during their use.
   - Alterations, improper installation or application.
   - Non-compliance with this instruction manual
   - Repairing or modification by parties not explicitly authorized by ELIFRANCE.
   - Discharge from failure, flood, fire, lightning and any other event that is beyond ELIFRANCE control.
3. After a period of 25 years from the date of sale (attested by the bill of sale) is not possible to appeal to clauses 1 and 2 even to cover the cost of shipping, customs clearance and any other charges for the restitution of faulty modules, the shipping of the repaired or replaced modules, the installation, the removal and reinstallation of the modules. All these costs are paid only by the customer.
4. The warranty will not apply if the serial number of the module has been altered, removed or made illegible.
5. Unless otherwise agreed, transport damages could not be claimed. The goods were transported under customer responsibility. Responsibility transfer is done at the output of the factory.

LIMITATION OF WARRANTY PURPOSE

The warranties described herein exclude all other warranties, whether written, oral or implied, including, for example, but not limited to, warranties of merchantability and / or suitability for a particular purposes, uses or applications and all other obligations and responsibilities of ELIFRANCE which have not been issued in writing and approved by the manufacturer.
ELIFRANCE will not be responsible for damages to people or property or economic loss arising from causes irrelevant to the product. In no case ELIFRANCE will be liable for incidental or consequential damages arising from the use of the product.
The loss of usability of the product, loss of business profits, loss of production and any other economic loss are not covered by the warranty.

ACCESS TO WARRANTY

A customer who means to take advantage by guarantee clauses, has to send a notification by e-mail at info@elifrance.com or by postal service to: ELIFRANCE, ZI Molina la Chazotte, 443 rue René Cassin, 42350 La Talaudière, France.
In the notification, the customer must indicate the evidence of the defect, a description of the same, the serial number of the faulty photovoltaic module and a copy of the purchase invoice with date. Useful for a faster management of the claim can be images or photographs.
The return of the modules will not be accepted before an express permission in writing that will be provided by the manufacturer.

VARIOUS

The repairing, replacement, or the provision of supplementary modules do not cause the beginning of a new warranty period. Consequently, the period of validity referred to clauses 1 and 2 will not be considered extensible. ELIFRANCE reserves the right to send different types of modules (in size, color, shape and / or power) in case the module under warranty is out of production at the time of claim.

VALIDITY

These terms and conditions of warranty are valid for all photovoltaic modules shipped from ELIFRANCE to the final customer.

WEEE DISPOSAL
INFORMATION TO THE USERS

According the directive 2012/19/UE the photovoltaic modules at the end of life are considered waste of electric and electronic equipment (WEEE), as shown by the crossed bin symbol on the product label.
The photovoltaic module and its parts should therefore not be disposed of domestic waste.
The user has to carry out a separate collection in order to avoid potential effects on the environment and human health due to the presence of any hazardous substances not properly managed.
The separate collection and recycling of such equipment will help to conserve natural resources and ensure that they are managed in accordance with the environment and health protection.
To identify the most appropriate method of disposal, contact the local collection centers or contact WEEE collective management system with which the manufacturer has adhered to.
WEEE once taken at the collection centers or assigned to the operators of the system, are addressed to the process of treatment, recovery and, possible, disposal in accordance with local regulations.
ELIFRANCE adheres to appropriate collective system that deals with the treatment of PV modules at the end of life.

PHOTOVOLTAIC MODULES SERIES EL 60 AND EL 72

Manual for the Safety, Installation, Use, Maintenance, Warranty and Disposal

TECHNICAL DATA

OPERATING CONDITIONS

EL series modules are designed and manufactured to operate within these parameters:

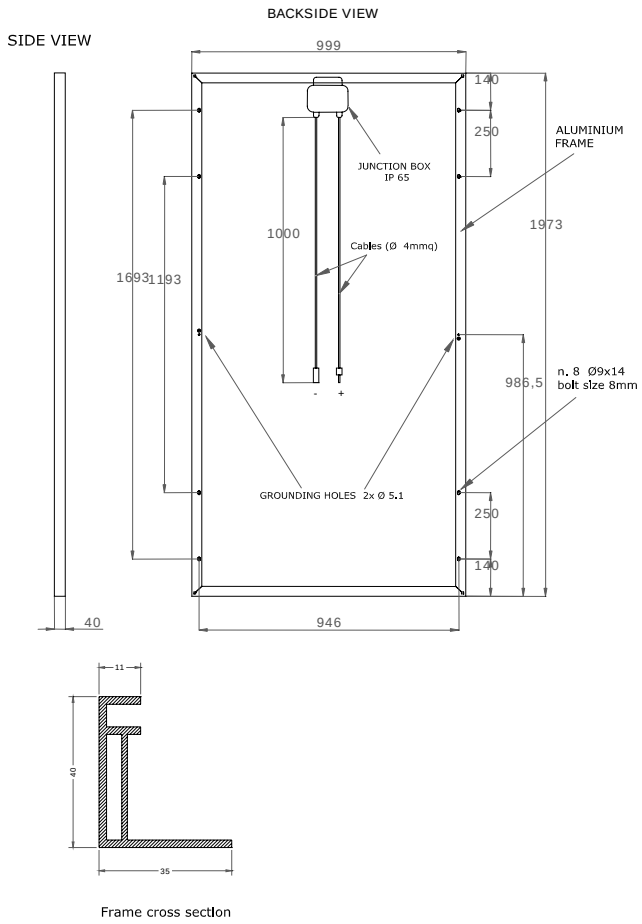
- ☐ *Operating temperatures* **+ 80 °C / - 40 °C**
- ☐ *Maximum load surface* **244 kg/m^2**
- ☐ *Hail resistence* **Ø 25mm / 7gr at 82Km/h**

EL 60 (EL 72) CONSTRUCTION DETAILS

Type of photovoltaic cell	**Polycristalline silicon**
Photovoltaic cell dimension	**156 x 156 mm**
Photovoltaic cell thickness	**200 µm ± 40µm**
Number of cells and layout	**60 (72) cells in 10 (12) rows x 6 columns**
NOCT (Normal Operating Cell Temperature)	**46 °C**
Module weight	**19 kg (23 kg)**
Protection	**IP65**
Maximun system voltage	**1.000 VDC**
By-pass diodes	**3 diodes Schottky 15A**
Connectors	**MC4 compatible**

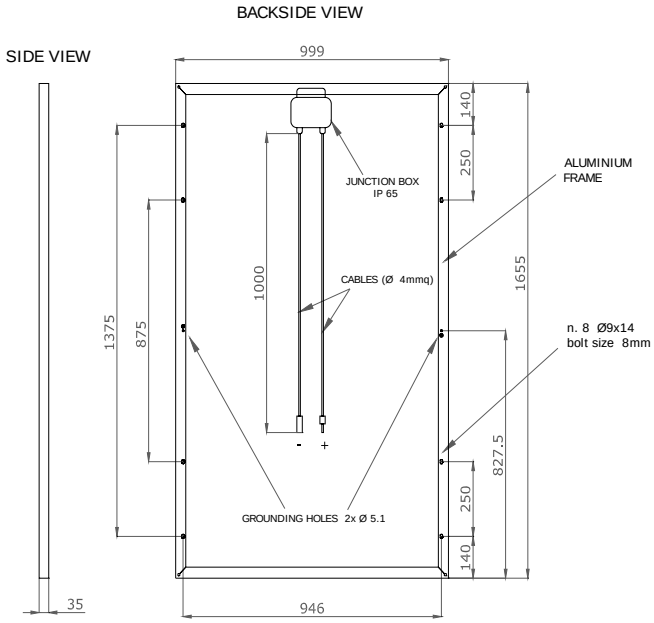
GEOMETRIC DIMENSIONS AND SECTION FRAME (mm)

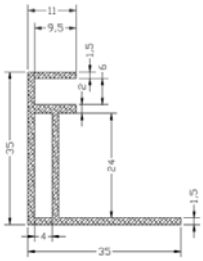
EL 72 SERIES



Frame cross section

EL 60 SERIES





ELIFRANCE

Elifrance s.a.s

Z.I. Molina la Chazotte
443 rue René Cassin
42350 La Talaudiere – France
Tel.:+33 477 463939
Mail: info@elifrance.com --